



The Space Congress® Proceedings

2018 (45th) The Next Great Steps

Feb 28th, 9:00 AM

Canadian Space Agency Overview of Space Exploration Programs

Pierre Jean

Director, Space Exploration Strategic Planning, Canadian Space Agency

Follow this and additional works at: <https://commons.erau.edu/space-congress-proceedings>

Scholarly Commons Citation

Jean, Pierre, "Canadian Space Agency Overview of Space Exploration Programs" (2018). *The Space Congress® Proceedings*. 4.

<https://commons.erau.edu/space-congress-proceedings/proceedings-2018-45th/presentations/4>

This Event is brought to you for free and open access by the Conferences at Scholarly Commons. It has been accepted for inclusion in The Space Congress® Proceedings by an authorized administrator of Scholarly Commons. For more information, please contact commons@erau.edu.

EMBRY-RIDDLE
Aeronautical University™
SCHOLARLY COMMONS



Canadian Space Agency Overview of Space Exploration Programs

Pierre Jean
Director, Space Exploration Strategic Planning

2018-02-28



Agence spatiale
canadienne

Canadian Space
Agency

Canada

CANADIAN SPACE AGENCY – ONGOING PROJECTS

JAMES WEBB
SPACE TELESCOPE



OSIRIS-REx



MARS SCIENCE LABORATORY



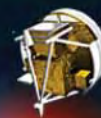
MARITIME MONITORING AND MESSAGING
MICROSATELLITE (M3MSat)



INTERNATIONAL SPACE STATION



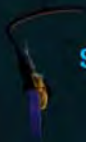
SCISAT



SWARM



SMAP



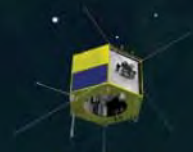
RADARSAT CONSTELLATION
MISSION (RCM)



NEOSSat



CASSIOPE



Mobile Servicing System Operations

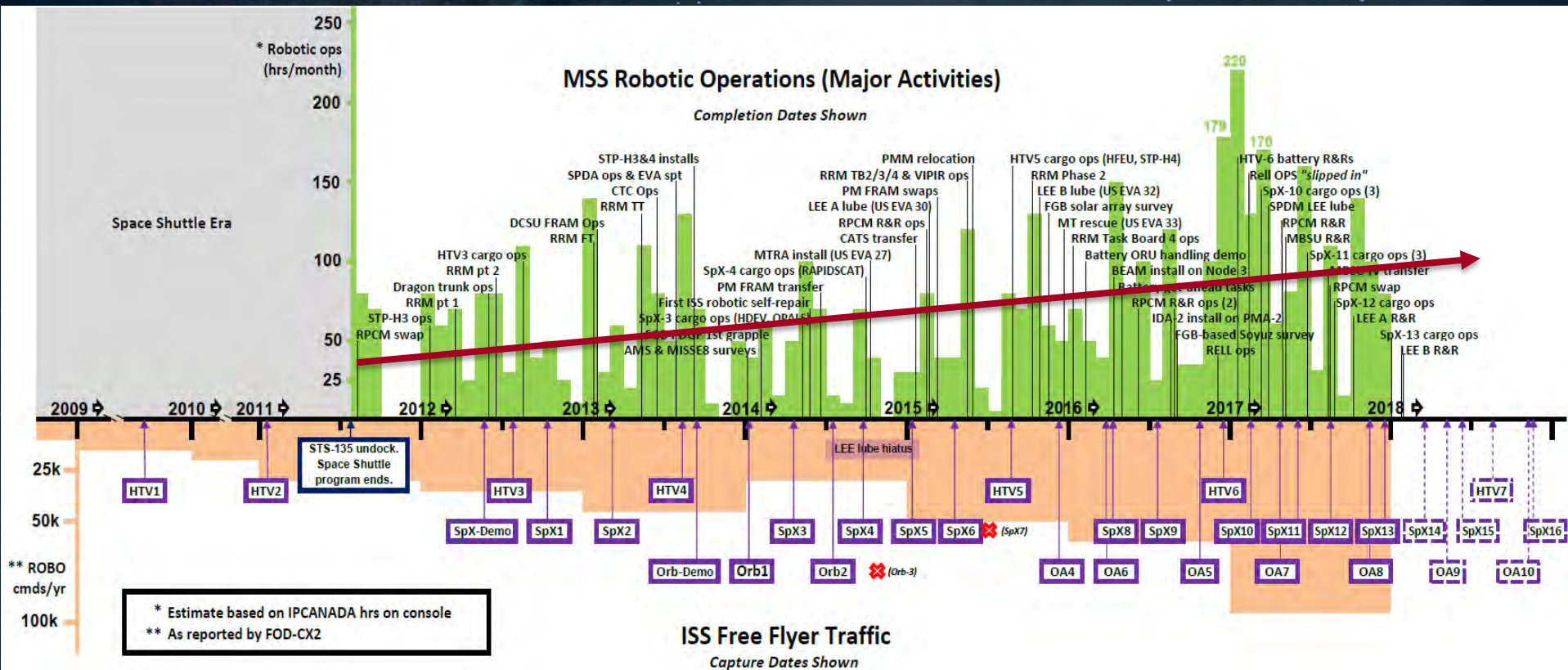


Unprecedented level of Robotics Operations



Modular and repairable

The Most Space Robotics in History (as of January 9, 2018)



Bringing Autonomy to MSS

Drivers for Autonomy

Now:

- Unprecedented MSS utilization
- High overhead
- Rapid re-planning

Deep Space:

- Remote
- Limited Crew manning

Benefits

- Efficiency
- Streamlining
- Reaction time
- Execution time
- Complimentary with existing Ops strategies
- Overlays
- Safety monitoring
- Robotic Payload Support
 - RELL
 - DDVS

International Engagement

- International Space Exploration Coordination Group
 - The Global Exploration Roadmap provides a coordinated vision for human space exploration while recognizing the criticality of increasing synergy with robotic missions
- International Space Station Exploration Capabilities Study Team member
 - Deep Space Gateway/Lunar Orbiting Platform
- Human Enhanced Robotic Architecture Capability for Lunar Exploration and Science
 - A partnership between ESA, JAXA and CSA with NASA participation



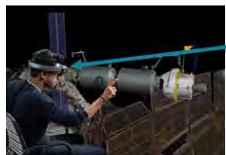
Deep Space Technologies

- Deep Space Exploration Robotics
- Relative Navigation System
- Other areas of interest
 - RF and optical communications
 - Lunar surface mobility
 - Health and Medical systems
 - Synthetic Aperture Radar

Deep Space Exploration Robotics

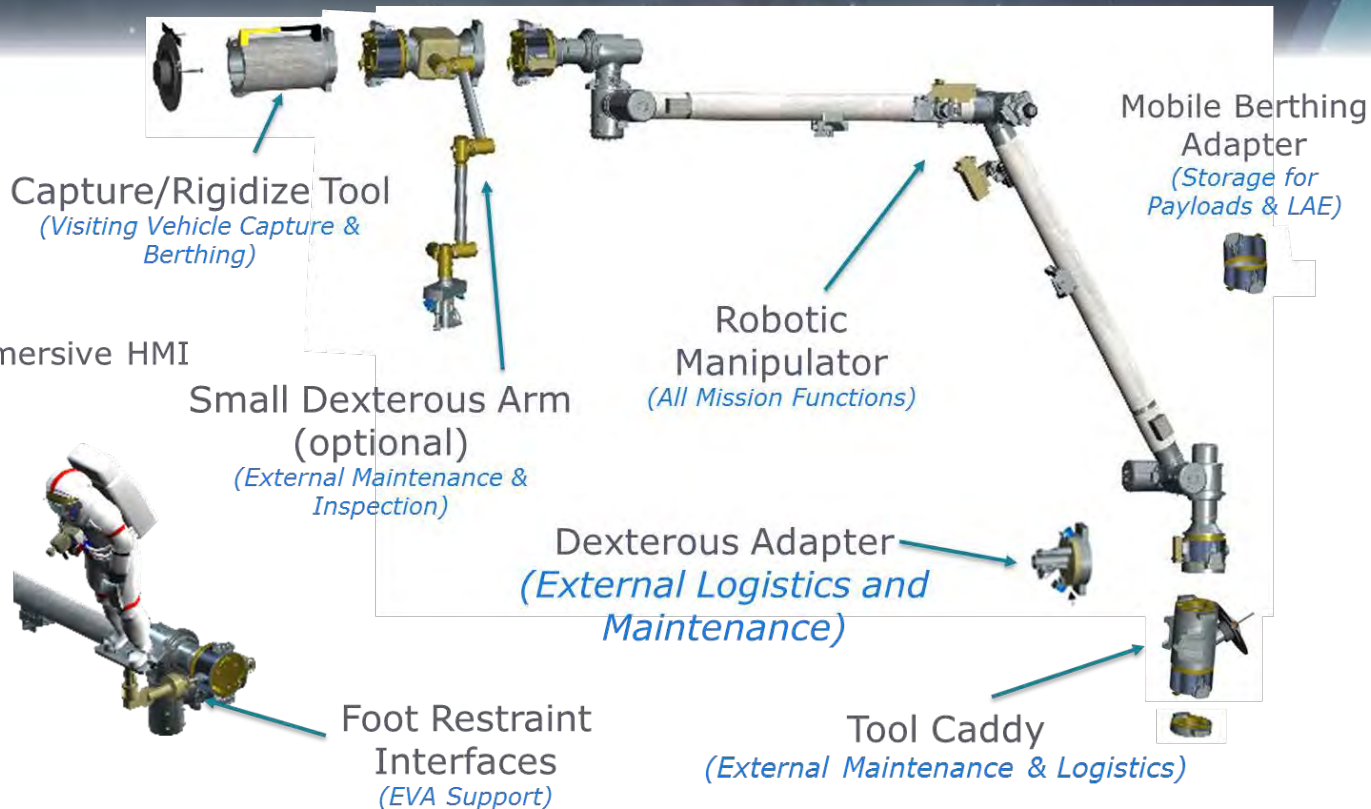


Mission Planning
(Cognitive Model Based
Mission Planning Software)



Immersive HMI

**Executive Control
Software**



Capture/Rigidize Tool
(Visiting Vehicle Capture &
Berthing)

**Small Dexterous Arm
(optional)**
(External Maintenance &
Inspection)

**Robotic
Manipulator**
(All Mission Functions)

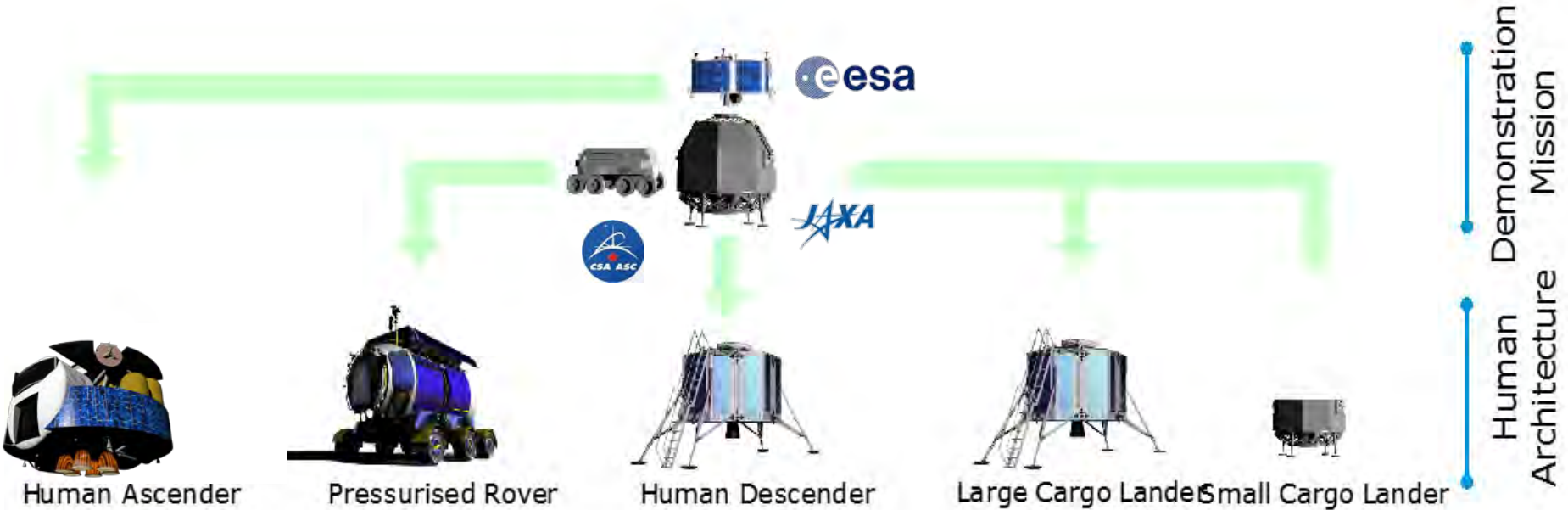
Dexterous Adapter
(External Logistics and
Maintenance)

**Foot Restraint
Interfaces**
(EVA Support)

Tool Caddy
(External Maintenance & Logistics)

**Mobile Berthing
Adapter**
(Storage for
Payloads & LAE)

An Evolutionary Path to Human-Rated Systems



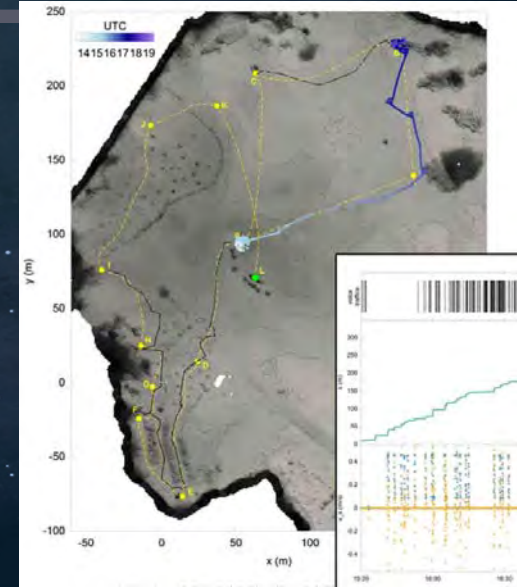
Mission Objectives

- Prepare for human missions to the Moon by implementing, demonstrating and certifying technology elements for future human lunar landing
- Create opportunities for scientific research (e.g. sample return)
- Gain science and exploration knowledge about the Moon
- Create opportunities to demonstrate and test technological and operational capabilities for future Mars exploration missions



Rover

- The rovers main purpose is to perform surface operations and sampling
 - Transport the sample container and with a device to extract samples from the lunar surface and transfer it to the container
 - Capable to survive and operate during the lunar night
 - Capable to communicate directly to the station
 - Transfer the sample container to the Lunar Ascent Module
 - Operate in 3 different modes:
 - Autonomous
 - Tele-operated/Super-visual (Orbit or ground)
 - Tele-operated/Fully manually (From orbit)



Rover

Mission	Long duration surface operation
Mission	Sample collection
Duration	12 months
Mass	500kg
Technology	Tele-operation
	Radioisotope power system



asc-csa.gc.ca

Canada 